12.2 GHz band be sufficiently low to permit its use by user terminals in the "Red Zone." Finally, all require assurance that the "Red Zone" will be small and quantified. While the precise numerical limits required by systems in this second class may vary somewhat, all require the kinds of protection outlined by SkyBridge.

While SkyBridge does not presume to speak for other NGSO FSS applicants, it should be noted that no NGSO FSS applicant has ever responded one way or another to SkyBridge's proposal, which has been on the public record for more than 6 months. Moreover, it is critical to keep in mind that these systems -- including Northpoint's -- have not yet been deployed. This affords a measure of flexibility to the respective system designers to facilitate operations in a shared use environment, although some systems, being at different stages of their design processes, may have greater flexibility than others.

In the absence of such limits, some of the proposed systems will not be able to implement frequency diversity to avoid MVDDS interference. Because the Commission is relying on use of frequency diversity to permit NGSO FSS/MVDDS sharing, it must adopt a regulatory regime that facilitates -- rather than defeats -- reliance on this technical solution.

(ii) The Commission's argument that SkyBridge's proposal would require EPFD measurements at every NGSO FSS earth station is simply wrong.

The Commission argued that the rules would mean that "EPFD requirements would have to be measured at each NGSO FSS earth station."[74/] This argument is not

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74/ FNPRM, ¶ 280.

correct. EPFD limits are exactly the method adopted by the Commission to govern NGSO FSS sharing with GSO FSS and GSO BSS systems, including in the subject band. The Commission is well aware of the many options available for prescribing and enforcing such limits.

First, as proposed above, a validation procedure can be used, whereby the licensee demonstrates, most likely using agreed computations or simulations, that the limits will be met. The Commission cannot seriously argue that it will be more complex for a fixed terrestrial facility to compute the power levels generated over its area of operation than it is for a global NGSO FSS system with moving satellites and steerable beams.

Second, for EPFD limits that are operational in nature, no compliance assessment would be performed prior to operation of the MVDDS system. Measurements would be undertaken only in cases of suspected interference in excess of the limit. As discussed above, because operational limits are proposed only in cases where it is recognized by all parties that the likelihood of exceeding the limit is quite remote, measurement should be necessary in very few cases. Moreover, it is totally contradictory for the Commission, one of the principal architects of operational limits as applied to NGSO/GSO sharing, to claim that such a regime constitutes an unreasonable burden to either party.

2. Limits Applied To NGSO FSS Operations

As noted above, Northpoint seeks a level of protection far in excess of that required by other terrestrial services. It has requested a 10 dB tightening of the Article S21 limits at low elevation angles. Setting aside the fact that Northpoint has never offered a credible or consistent technical justification for its claimed protection criteria,[75] SkyBridge believes that a regulatory mechanism could be devised that would accommodate that need, as was outlined in the SkyBridge Proposal.

The Article S21 limits adopted internationally are "envelope" limitations, and in operation, SkyBridge will operate in most cases at levels lower than those limits. For this reason, SkyBridge has proposed that the Commission adopt the S21 limits in its rules, without the tightening requested by Northpoint, but augment those limits with tighter limits that would function in a manner similar to the "operational limits" imposed on NGSO FSS systems for the protection of GSO FSS and BSS systems. In other words, the NGSO FSS system would be obligated to honor these additional limits *in operation*, into any *operational* MVDDS receiver, but would not be bound to demonstrate compliance with these limits in cases where no MVDDS receiver would be affected. If a violation is demonstrated by an

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[75] For example, in its ITU-R contributions and NPRM Comments (Technical Annex at 20), Northpoint based it needs on FS protection criteria and stated that it required a C/N of 7 dB with a margin of 3 dB. In a January 6, 2000, letter to the Commission, Northpoint based it needs on BSS protection criteria and stated that it required a C/N of 7.9 dB with a margin of 2.9 dB. *Ex Parte* of Northpoint Technology, Ltd., ET Docket No. 98-206, RM-9147, RM-9245, January 6, 2000, Technical Annex at 5. The values are based on Northpoint's "typical" case, and no information has been provided on the sensitivity of some of the parameters to NGSO FSS interference (size of service area, altitude of receiver, etc.)

MVDDS licensee, the NGSO FSS operator would have to take steps to reduce the power at the affected location sufficient to meet the operational limits. SkyBridge proposed the limits set out in the table below and in Exhibit A, which *fully meet the stated protection requirements of Northpoint*:

Type of Limit	**Angle of Arrival (δ)**				**Units**
	0-2°	**2-5°**	**5-25°**	**25-90°**	
S21 limits in 12.2-12.7 GHz band	-124		-124 + 0.5 (δ-5)	-114	dB(W/m^2/MHz)
Operational limit	-134	-134 + 3.33 (δ-2)	-	-	dB(W/m^2/MHz)

As noted above, use of operational limits is appropriate only in cases in which exceeding the limits is highly unlikely. That is the case here. First, Northpoint's analysis indicates that the geographic regions over which its user terminals could potentially be affected by higher PFD are limited.[76/] This is because only those Northpoint user terminals located at the edge of coverage of the Northpoint service area, where the Northpoint power is low, could be affected. And in those regions, only those user terminals pointed in a

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[76/] See, e.g., Northpoint NPRM Comments, Technical Annex at 25. Northpoint's computations showed that 25% of its service area could be affected for a "typical" Northpoint deployment at 30° latitude. Note should be taken, however, of the impact of certain simplifying assumptions used by Northpoint in its analysis, which lead to unrealistically pessimistic results. For example, Northpoint did not take into account the fact that NGSO FSS interference is time-varying, and also assumed transmission of maximum power by all satellites at all times. Moreover, it examined the worst-case latitude location over the U.S. for a SkyBridge-like system In addition, Northpoint did not take into account the variation of its transmitter parameters in response to local propagation conditions. Therefore, it can be expected that, in practice, the affected area will be much smaller than predicted by Northpoint's calculations, even in the absence of the further mitigation factors discussed below, and the number of potentially affected *operational* MVDDS terminals will be low.

direction in which an NGSO FSS satellite may, at some time, be seen near the horizon, could be affected. Because NGSO FSS satellites are not seen at the horizon at all azimuths,[77] only two small portions of the edge of the service region could be affected. In addition, the range of azimuths over which satellites may be seen near the horizon shrinks as latitude increases, so the area within which Northpoint user terminals could potentially be affected also shrinks as latitude increases. Moreover, in these small areas, the user terminals would be pointing at very low elevation angles, with links designed for relatively short paths compared to more traditional FS links, thus often benefitting from natural blockage between the receiver and the potentially interfering satellite. Finally, SkyBridge will in most cases meet the tighter limits in operation.

Therefore, an MVDDS receiver will be adversely affected only if it happens to be placed in a worst-case alignment with respect to the NGSO FSS system *and* an NGSO FSS satellite happens to be emitting near maximum power in its direction. It can therefore be expected that this operational limit will be exceeded rarely, if ever, and therefore assessing compliance with the operational limits will not be unduly burdensome for either party.

This regime serves the purposes of both services. MVDDS systems would be protected in operation, in full accordance with their stated requirements,[78] and NGSO FSS

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[77] An NGSO FSS constellation has specific azimuth angle ranges within which satellites come over and descend below the horizon.

[78] The limits are expressed in terms of 1 MHz instead of the 4 kHz to reflect the wide-band operations of NGSO FSS systems. This change does not affect the (continued...)

systems could operate at the internationally-adopted S21 limits, except where this would cause interference at levels higher than the operational limits into an operational MVDDS receiver. The proposal therefore represents a balanced proposal for creating an environment in which NGSO and MVDDS systems can coexist.

CONCLUSION

The NGSO FSS/MVDDS "sharing" rules proposed by the Commission in the Further Notice are, in reality, not sharing rules at all. They are grossly discriminatory in favor of MVDDS systems. Without any justification whatsoever, the Commission proposes to relax (or eliminate altogether) for MVDDS systems the strict standards and burdens of technical proof imposed on NGSO FSS systems. The proposals set out in the Further Notice are based on false assumptions, are fraught with factual errors and regulatory inconsistencies, and are simply unworkable as a means for permitting equitable sharing between NGSO FSS and MVDDS systems.

On the other hand, the rules proposed by SkyBridge would adequately protect both services, without imposing unnecessary or debilitating burdens on either service,

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78/ (...continued)
protection afforded to MVDDS systems.

consistent with their co-primary status. Moreover, they can be implemented and enforced through a simple regulatory regime and implementation procedures. Therefore, in the event that the Commission maintains its premature MVDDS allocation, SkyBridge urges the Commission to adopt the SkyBridge Proposal for NGSO/MVDDS sharing.

Respectfully submitted,

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EXHIBIT A

Proposed Rules

In Section **25.208(b)**, add the following new paragraph before "Note to paragraph (b)":

> In the band 12.2-12.7 GHz, the power flux-density at the Earth's surface produced by emissions from an NGSO FSS space station for all conditions and for all methods of modulation shall not exceed -124 dB(W/m^2) in any 1 MHz band for angles of arrival (δ) (in degrees) between 0 and 5 degrees above the horizontal plane; -124 + 0.5 (δ - 5) dB(W/m^2) in any 1 MHz band for angles of arrival between 5 and 25 degrees above the horizontal plane; and -114 dB(W/m^2) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane. In addition, the power flux-density shall not exceed, into an *operational* MVDDS receiver, -134 dB(W/m^2) in any 1 MHz band for angles of arrival between 0 and 2 degrees above the horizontal plane and -134 + 3.33 (δ - 2) dB(W/m^2) in any 1 MHz band for angles of arrival between 2 and 5 degrees above the horizontal plane.

In Section **101.113**, add the following new section **(d)** at the end:

> **(d) (1)** In the band 12.2-12.7 GHz, the power flux-density (PFD) produced by emissions from an MVDDS transmitter for all conditions and for all methods of modulation shall not exceed -120 dB(W/m^2) in any 1 MHz band over 90% of the service area, as defined in paragraph (4), of the MVDDS transmitter. This limit may be exceeded over 10% of the service area.
>
> **(2)** In the band 12.2-12.7 GHz, the equivalent power flux-density (EPFD), as defined in paragraph (4), produced by emissions from all MVDDS transmitters for all conditions and for all methods of modulation shall not exceed -135.1 dB(W/m^2) in any 4 kHz band over 99.8% of the service area, as defined in paragraph (4), of the MVDDS system. This limit may be exceeded over 0.2% of the service area.
>
> **(3)** In the band, 12.2-12.7 GHz, the EPFD, as defined in paragraph (4), produced by emissions from all MVDDS transmitters of an MVDDS system for all conditions and for all methods of modulation shall not exceed -132.1 dB(W/m^2) in any 4 kHz band into any *operational* NGSO FSS receiver, no matter where such receiver is located or pointed.
>
> Note to paragraphs (1) and (2): These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions.

(4) *Definitions*

The *service area* of the MVDDS transmitter is defined as the geographic area over which the MVDDS power on the ground is sufficient for reception of the MVDDS service, using the standard consumer equipment employed by the MVDDS operator, and in accordance with the operator's standard performance objectives.

The *EPFD* is the sum of the power flux-densities produced at an NGSO FSS receiver by all the MVDDS transmitters, taking into account the off-axis discrimination of a reference NGSO FSS receiving antenna, as defined below. The EPFD, in dB(W/m^2) in the reference bandwidth, is calculated using the following formula:

$$EPFD = 10 \log_{10} \left[\sum_{i=1}^{Na} 10^{Pi/10} \cdot [G_t(\theta_i) / 4\pi d_i^2] \cdot [G_r(\phi_i) / G_{r,max}] \right]$$

where:

N_a is the number of MVDDS transmitters that are visible from the NGSO FSS user terminal;

i is the index of the MVDDS transmitter;

P_i is the RF power at the input of the antenna of the MVDDS transmitter in dBW in the reference bandwidth;

θ_i is the off-axis angle between the boresight of the MVDDS transmitter and the direction of the NGSO FSS user terminal;

$G_t(\theta_i)$ is the transmit antenna gain (as a ratio) of the MVDDS transmitter in the direction of the NGSO FSS user terminal;

d_i is the distance in meters between the MVDDS transmitter and the NGSO FSS user terminal;

ϕ_i is the off-axis angle between the boresight of the antenna of the NGSO FSS user terminal and the direction of the ith MVDDS transmitter;

$G_r(\phi_i)$ is the receive antenna gain (as a ratio) of the reference NGSO FSS user terminal in the direction of the ith MVDDS transmitter;

$G_{r,max}$ is the maximum gain (as a ratio) of the antenna of the reference NGSO FSS user terminal.

The EPFD limits in paragraphs (2) and (3) have been defined for a reference NGSO FSS receiving antenna with a pattern 36-25 log θ ($100\lambda/D \leq \theta < 48°$), -6 ($\theta \geq 48°$), and a maximum gain of 31.6 dBi at 12.5 GHz. In applying the EPFD definition to the limit in paragraph (2), it shall be assumed that the NGSO FSS user terminal always points toward the NGSO FSS satellite seen the closest to the MVDDS transmitter from the NGSO FSS user terminal. In applying the EPFD

definition to the operational limit in paragraph (3), the actual pointing directions for the operational NGSO FSS user terminal shall be considered.

§ 101.___ Licensing and operating authorization provisions for MVDDS systems in the band 12.2-12.7 GHz

A comprehensive technical showing shall be submitted for each proposed MVDDS transmitter or system in the band 12.2-12.7 GHz demonstrating that the proposed MVDDS system would not exceed the PFD and EPFD limits specified in § 101.113(d)(1) and (2). If the technical showing indicates that the PFD or EPFD limits, as described in those sections, will be exceeded, the application would be unacceptable for filing and will be returned to the applicant with a brief statement identifying the non-compliance. The technical showing for each MVDDS transmitter shall consist of the following:

(1) A map indicating:

(i) the boundary of the service area (as defined in § 101.113(d)(4) above);

(ii) the boundary within which the PFD limit specified in § 101.113(d)(1) may be exceeded; and

(iii) the boundary within which the EPFD limit specified in § 101.133(d)(2) may be exceeded.

(2) Information used to compute the map, including transmitter power, antenna pattern, tilt angle, height, and polarization.

§ 101.109 Bandwidth

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(c) * * *

Frequency Band (MHz)	Maximum authorized bandwidth
* * * * * *	
12,200 to 12,700[8]	24 MHz
* * * * * *	

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[8] For incumbent private operational fixed point-to-point stations in this band the maximum bandwidth shall be 20 MHz.